

## ECONOMIC GROWTH AND MARKET LIBERALIZATION IN CHINA: IMPLICATIONS FOR AGRICULTURAL TRADE

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**S**INCE the end of the Cultural Revolution the Chinese economy has grown very rapidly. This growth has been spurred by the major economic reforms of the late 1970s and early 1980s which, among other things, liberalized domestic agricultural markets and international trade and in particular raised many producer prices for farmers. During the 1973–83 period China's income per capita grew at an annual rate of 4.5 per cent, almost treble that of other developing countries, while its foreign trade grew at more than twice the rate for the rest of the world.

Much of this economic growth is accounted for by the very rapid expansion in agricultural production following the introduction in 1978 of the Production Responsibility System. The dramatic difference in agricultural output growth before the reforms and since is clear from Table I. Indeed, farm output has grown so much that in 1984 and 1985 China's agricultural exports exceeded its agricultural imports for the first time in recent history (Table II).

The emergence of an agricultural trade surplus surprised many observers, particularly in food-exporting countries which had hopes for China becoming a major food importer during the next decade or two. It raises the question as to whether this trade surplus is a short-term aberration or a long-term structural change, and more broadly as to the likely importance of China in world food trade in the years ahead.

The purpose of the present paper is to shed some light on this question. The paper begins by briefly drawing on trade theory and recent empirical evidence to argue that China has experienced and is likely to continue to experience declines in its agricultural comparative advantage, notwithstanding the turnaround in 1984.

The second section, which is the major part of the paper, then examines more closely the recent and prospective trends in China's grain, livestock, and sugar markets, using a global dynamic simulation model of those markets. These results

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TABLE I  
AGRICULTURAL PRODUCTION, YIELD, AND PRICE GROWTH  
IN CHINA, 1957-78 AND 1978-84

	(% p.a.)	
	1957-78	1978-84
Production growth		
Grain	2.1	4.9
Soybean	1.1	4.2
Other oil-bearing crops	1.0	14.6
Sugar cane	3.4	11.1
Sugar beet	2.8	20.5
Cotton	1.3	18.7
Tea	4.2	7.4
Tobacco	7.0	17.0
Red meat	3.7	10.1
Yield per hectare growth		
Grain	2.6	6.1 <sup>a</sup>
Sugar cane	0.0	4.3 <sup>a</sup>
Cotton	2.1	11.5 <sup>a</sup>
Product price growth <sup>b</sup>	1.9	8.1 <sup>a</sup>

Sources: [8] [9].

<sup>a</sup> 1978-83.

<sup>b</sup> General index of purchase prices of farm and sideline products.

TABLE II  
CHINA'S AGRICULTURAL OUTPUT AND TRADE, 1980 TO 1985

	1980	1981	1982	1983	1984	1985
Index of agricultural output (1978=100)						
Crops	107	113	125	135	147	n.a.
Livestock	123	130	147	153	171	n.a.
Total	109	116	129	139	152	n.a.
Value of agricultural trade (U.S.\$ billion)						
Exports	4.2	4.6	4.3	3.8	4.5	5.5
(% of total exports)	(22)	(21)	(19)	(17)	(18)	(20)
Imports	5.2	5.1	4.9	4.1	2.9	2.3
(% of total imports)	(27)	(28)	(29)	(19)	(11)	(5)

Sources: U.S. Department of Agriculture, *China Outlook and Situation Report*, July 1985 and July 1986 editions (Washington, D.C.).

reinforce the conclusion of Section I that China's comparative advantage in food production is likely to keep declining in the long run, although the extent of the decline is shown to depend importantly on the rates of growth in incomes and agricultural productivity.

Whether China will allow food import dependence to grow as its comparative

advantage declines is a moot point. The government may well use price or trade policy instruments to prevent a decline in food self-sufficiency. The model is therefore also used to simulate the impact of such policy changes on food production and trade.

Because data and parameter estimates for China are still of lower quality than those for many other countries, projections based on currently available data must necessarily have relatively wide confidence intervals.<sup>1</sup> Moreover, markets in China are still subject to some quantitative restrictions which weaken the linkages between prices and quantities supplied and demanded—though much less so now than before the reforms began in the late 1970s. Nonetheless, more insights are likely to result from making various explicit assumptions about behavioral relationships and parameter values, and using empirical models to simulate prospective market developments under alternative assumptions, than by crystal-ball gazing without the use of models.

The main results are summarized in the final section of the paper, followed by a discussion of their implications for China and for China's main partners in agricultural trade.

### I. AGRICULTURE'S RELATIVE DECLINE IN CHINA

Agriculture has progressively declined in importance in China. In the early 1950s, only one in ten workers was employed outside agriculture; today the ratio is one in four. Agriculture's contribution to national income fell from two-thirds to one-third over the three decades to 1978, although its share has since risen to 45 per cent following the recent policy reforms which have raised farm product prices and induced large increases in agricultural production. Likewise, agriculture's importance in export earnings has halved since the early 1950s.

The decline in the importance of agriculture in China is typical for a growing economy. The employment and GDP shares in the 1960s and 1970s for China were very similar to those for other low-income countries. The share of exports from agriculture, however, has been low in China relative to other developing countries, and until 1983 food accounted for a relatively large share of China's imports (Table III).

A major reason for China's low agricultural export share and high food import share is its small land area per worker. China is endowed with only 0.9 hectares per capita (less than one-third of which is useful agriculturally), compared with 2.5 hectares in other developing countries and 4.2 hectares in advanced industrial countries. Trade theory suggests that the lower a country's land/labor ratio the weaker is likely to be its agricultural comparative advantage relative to that of other countries with similar capital/labor ratios [1].

The negative relationships between agriculture's share of employment (EMPSH), gross domestic product (GDPSH), and exports (EXPSH) on the one hand, and income per capita (YPC) on the other, are very significant statistically. These

<sup>1</sup> See, for example, [13] [12] [7] [11] [16] [17].

TABLE III  
 AGRICULTURE'S SHARE OF EMPLOYMENT, GDP, AND TRADE, CHINA AND  
 OTHER DEVELOPING COUNTRIES, 1965 AND EARLY 1980

	Employment		GDP		Exports		Imports <sup>a</sup>	
	1965	1981	1965	1984	1965	1983	1965	1982
China	82 <sup>b</sup>	74	39	36	40 <sup>b</sup>	22	na	23
Other low-income countries	78	72	45	36	62	47 <sup>c</sup>	20	13
Lower middle-income countries	66	54	31	22	66	33	17	14
Upper middle-income countries	45	30	17	10	37	19	15	11

Sources: World Bank, *World Development Report*, 1985 and 1986 editions (New York: Oxford University Press).

<sup>a</sup> Food only.

<sup>b</sup> From China, State Statistical Bureau, *Zhongguo tongji nianjian* [*Statistical yearbook of China*] (Beijing, 1984). Note that China uses somewhat different definitions than the standard ones used by the World Bank. In particular, China includes more of what the United Nations would classify as 'manufactured goods' in its 'processed agricultural goods' category of foreign trade statistics. The 1965 export share for China of 40 per cent refers to unprocessed agricultural goods; the comparable figure for 1983 is 16 per cent.

<sup>c</sup> 1982.

shares are also negatively associated with population density per unit of agricultural land (PD), although significantly so only for EXPSH. This is clear from the following cross-sectional regression equation estimates for 1981, which are based on World Bank data for the thirty-five developing countries with populations in excess of 10 million (*t*-values in parentheses):

$$\text{EMPSH} = 179 - 19.2 \ln \text{YPC}, \quad \bar{R}^2 = 0.79 \quad (1)$$

(11.5)

$$\text{GDPSH} = 125 - 14.9 \ln \text{YPC}, \quad \bar{R}^s = 0.73 \quad (2)$$

(9.6)

$$\text{EXPSH} = 223 - 18.8 \ln \text{YPC} - 11.4 \ln \text{PD}, \quad \bar{R}^s = 0.42 \quad (3)$$

(4.9)                      (3.2)

The lower explanatory power of the export share equation is due in large part to the fact that many countries have policies which distort food prices and those policies have more influence on trade than on production and employment.

As a country's capital/labor ratio rises relative to the rest of the world's (due to increased incomes from which savings can be invested and/or to increased foreign capital inflows), that country's comparative advantage is likely to fall unless there is exceptionally rapid agricultural relative to nonagricultural produc-

tivity growth in that economy. Insofar as income per capita is a proxy for the capital/labor ratio, this theory therefore suggests that if incomes are growing rapidly in China relative to the rest of the world, there will be a tendency for agriculture's share of exports to decline even faster in China than in other countries (and for food import dependence to increase), *ceteris paribus*.

The shares which the above equations would predict for China in the early 1980s are close to China's actual shares for employment and income, but well above for exports. Presumably one of the reasons for the latter result is that China may have discouraged food exports more than other countries up until the early 1980s, for the purpose of keeping down urban food prices.

A crude idea of what those shares might be in the years ahead can be obtained by plugging into those equations future values for income per capita and population density based on expected national income and population growth rates for China and assuming the divergences between actual and predicted shares in the early 1980s are maintained in proportional terms through to, say, 1995. The projections are shown in Table IV assuming that China's population grows at 1.2 per cent per year during the next decade. (The projected shares are less than 1 percentage point different if 1.0 or 1.3 per cent population growth is assumed.) These results suggest that agriculture will have a substantially smaller role in the Chinese economy by 1995, contributing in the medium-growth scenario only 61, 27, and 17 per cent to employment, GDP, and exports, compared with 74, 35, and 23 per cent in 1981 (using World Bank definitions).

Should policy reforms and productivity growth continue to boost agricultural relative to nonagricultural output, the GDP and export shares may fall less rapidly than is suggested in Table IV. The employment share, however, is likely to still fall rapidly as farm specialization, the gradual adoption of imported labor-saving technologies and the increasing importance of purchased inputs and marketing and transport services reduce the growth in demand for labor on farms over time.

A country's comparative advantage in agriculture is usually measured by agriculture's share of exports from the country concerned relative to the share of agriculture in world exports [5]. This so-called index of "revealed" comparative advantage fell for China from 2.3 in 1970 to 1.6 in 1979–81,<sup>2</sup> and is projected in a recent study of global trade trends to fall to 1.0 by 1990 [2]. Moreover, the index of "revealed" comparative *dis*advantage in agriculture (based on import shares instead of export shares) is projected in that study to rise from 2.0 in 1979–81 to 2.7 by 1990. China's share of world agricultural exports is projected to be little different in 1990 from its 1979–81 share of 1.6 per cent, while its share of world agricultural imports is expected to rise from 1.7 per cent in 1979–81 to as much as 4 per cent by 1990 (reported in [4, Table 5]).

In short, it seems likely that agriculture will become a relatively much smaller

<sup>2</sup> For other low-income countries the "revealed" comparative advantage index in 1979–81 was 2.4. That is, China had a much weaker agricultural comparative advantage than other low-income countries, at least insofar as is evident from their trade specialization patterns (which are distorted to varying extents by price and trade policies).

TABLE IV  
 AGRICULTURE'S PROJECTED SHARE OF EMPLOYMENT, GDP,  
 AND EXPORTS, 1990 AND 1995

(%)

Assumed Real Growth in National Income, 1981-95 (% p.a.)	Employment			GDP			Exports		
	1981 Actual	1990 Projected	1995 Projected	1981 Actual	1990 Projected	1995 Projected	1981 Actual	1990 Projected	1995 Projected
5.3	74	67	63	35	31	28	23	20	18
6.3	74	65	61	35	30	27	23	19	17
8.0	74	63	56	35	28	24	23	18	16

Note: The projections are based on regression equations (1), (2), and (3) of the text, assuming population growth at 1.2 per cent per year and that there is the same proportional divergence between actual and predicted shares in 1990 and 1995 as in 1981. As in Table II, processed agricultural products normally considered as part of the food sub-sector of manufactured goods are excluded from the definition of agricultural exports.

part of the growing Chinese economy, contributing by 1995 perhaps only three-fifths of employment, one quarter of GDP and one-sixth of exports (excluding some of what the Chinese classify as "processed agricultural exports"); and that China's importance in world agricultural exports will grow little in aggregate, while its importance in agricultural imports will more than double during the 1980s.

This latter projection may seem inconsistent with the trend revealed in Table II for the period 1982-85. However, the switch to an agricultural trade surplus in those years may simply be a reflection of China's undeveloped internal transportation system and limited capacity to expand storage facilities quickly: these infrastructural problems may have made it more sensible to export the large production surpluses of certain areas in that period rather than try to distribute them internally, to deficit areas. If this is the explanation for the recent trade surplus, and if those infrastructural limitations are overcome quickly, then that surplus may well be short-lived.

## II. A CLOSER LOOK AT GRAIN, LIVESTOCK, AND SUGAR MARKETS

To obtain a clearer picture of longer-term prospects for China's food trade, it is necessary to look in more detail at the major individual commodity groups. Table V summarizes recent trends in China's grain, livestock product, and sugar markets, from which a number of points are worth noting. First, China is far more important in the world market for these commodities than its 2 per cent share of world GNP would suggest. In fact in 1984 China was the world's largest producer and consumer of rice, wheat, and pork and the second largest producer of coarse grain. Because grain, livestock, and sugar production in aggregate has more than doubled in China since the 1960s, the country now accounts for more than one-third of the world's rice and pork production and consumption, one-sixth of the world's wheat, one-eighth of the world's coarse grain, and one-twentieth of the world's sugar. Among the commodities listed in Table V, it is only for the relative luxuries of milk and beef that China has world production and consumption shares as low as its 2 per cent share in the total world economy.

Second, most of China's increased production has been consumed domestically: per capita consumption of rice has increased by more than half and consumption of wheat and sugar has more than doubled since the 1960s; per capita meat and milk consumption has increased by two-thirds since the 1970s.

Third, even with this continuing high degree of food self-sufficiency the volume of China's imports net of exports of all these commodities other than meat grew at roughly 20 per cent per year during the period 1975 to 1982. Only in the case of meat did net export volumes increase.

And fourth, China's importance in international trade differs considerably between products. During the 1960s and 1970s China supplied about one-seventh of the rice and up to one-twelfth of the nonruminant meat traded internationally,

TABLE V  
CHINA'S PRODUCTION, CONSUMPTION, AND TRADE IN SELECTED  
AGRICULTURAL PRODUCTS, 1961 TO 1983

	Production (1,000 tons) p.a.)	Net Imports (1,000 tons) p.a.)	Availability (1,000 tons) p.a.)	Apparent Consumption Per Capita (Kg p.a.)	Self- sufficiency <sup>a</sup> (%)	Share of World (%)			
						Production	Consumption	Imports	
<b>Rice</b>									
1961-64	47,840	-720	47,120	68	102	29	29	10	0
1970-74	81,780	-1,780	80,000	91	102	37	36	22	0
1980-83	107,450	-530	106,920	107	101	37	37	5	1
Growth									
1975-82 <sup>b</sup>	3.6	22.0	3.9						
<b>Wheat</b>									
1961-64	17,560	4,900	22,450	32	78	7	9	0	11
1970-74	34,770	4,660	39,420	45	88	10	11	0	8
1980-83	66,170	12,400	78,570	79	84	14	17	0	13
Growth									
1975-82 <sup>b</sup>	6.1	20.3	7.7						
<b>Coarse grain</b>									
1961-64	44,880	560	45,440	65	99	10	10	0	2
1970-74	63,710	530	64,240	73	99	10	10	0	1
1980-83	85,000	1,080	86,080	86	99	12	12	0	1
Growth									
1975-82 <sup>b</sup>	2.3	17.0	2.7						
<b>Ruminant meat</b>									
1961-64	2,380	-20	2,360	3	101	6	6	1	0
1970-74	420	-50	370	0	114	1	1	1	0
1980-83	800	-60	740	1	108	2	1	1	0
Growth									
1975-82 <sup>b</sup>	6.5	-26.8	5.4						



TABLE V (Continued)

	Production (1,000 tons p.a.)	Net Imports (1,000 tons p.a.)	Availability (1,000 tons p.a.)	Apparent Consumption Per Capita (Kg p.a.)	Self- sufficiency <sup>a</sup> (%)	Share of World (%)			
						Production	Consumption	Imports	
<b>Nonruminant meat</b>									
1961-64	9,550	-20	9,530	14	100	22	22	2	0
1970-74	8,120	-140	7,980	9	102	14	14	7	0
1980-83	14,600	-60	14,540	15	100	18	18	3	1
Growth									
1975-82 <sup>b</sup>	7.9	-4.4	7.9						
<b>Dairy products</b>									
1961-64	4,350	20	4,370	6	100	1	1	0	0
1970-74	4,780	100	4,880	6	98	1	1	0	0
1980-83	7,330	320	7,650	8	96	2	2	0	1
Growth									
1975-82 <sup>b</sup>	6.0	18.4	6.4						
<b>Sugar</b>									
1961-64	2,550	-100	2,450	3	104	4	4	5	5
1970-74	2,800	-70	2,730	3	103	3	3	3	3
1980-83	4,760	1,090	5,850	6	81	4	6	2	6
Growth									
1975-82 <sup>b</sup>	8.0	— <sup>c</sup>	12.7						

Source: Revision of Tyers and Anderson [15], based on USDA and FAO data.

Note: Rice is expressed in milled equivalent, meat in carcase weight, dairy products in milk equivalent, and sugar in raw equivalent.

<sup>a</sup> Production divided by availability, expressed as a percentage (net of stock changes in the case of sugar).

<sup>b</sup> Average compound growth rate (per cent per year) required to change from the 1975 level to the 1982 level.

<sup>c</sup> China switched from being a slight exporter of sugar in 1975 to a substantial sugar importer in the 1980s.

but at the same time accounted for about 10 per cent of world wheat imports. Its importance in international trade in dairy products has been negligible so far, while its importance in sugar trade has fluctuated with significant imports *and* exports in most periods (although imports have dominated exports increasingly over the past decade).

These recent trends in grain, livestock product, and sugar (GLS) markets can be projected to 1995 using a global dynamic simulation model that has been developed recently. The so-called GLS Model<sup>3</sup> is capable of projecting the effects on GLS markets not only of different rates of growth of incomes and agricultural productivity but also, by assuming values for the various price elasticities of demand and supply, of altering domestic prices.

To keep the paper to a reasonable length, only three sets of projections to 1995 are presented:

- (a) a reference scenario, in which real domestic food prices in China are assumed to remain at their 1980–82 level through to 1995, while population and real national income grow at 1.2 per cent and 6.3 per cent per year, respectively, agricultural output expands at the rates shown at the top of Appendix Table I and income elasticities of demand are as shown in the middle of Appendix Table I (all consistent with the government's targets to the year 2000);
- (b) a set of two slower-growth scenarios in which, first, national income is assumed to grow at one percentage point lower than the rate assumed in the reference scenario (5.3 instead of 6.3 per cent per year, or 16 per cent slower) and, second, price-independent GLS output growth is also 16 per cent slower than the reference scenario rate; and
- (c) a scenario in which domestic prices of all but rice (for which there is an export surplus) are raised 20 per cent above their 1980–82 level.

Results from each of these three sets of scenarios are discussed in turn.

#### A. *Reference Scenario*

The first part of each set of rows in Table VI presents the results for the reference scenario for 1990 and 1995 compared with the actual situation in 1980–83. Two main points are worth noting from the reference projection, which depends heavily on the assumed price-independent production growth rates and income elasticities of demand shown in Appendix Table I together with the assumed income per capita growth rate of 5.1 per cent per year (though not on prices or price elasticities of demand and supply since prices in China are assumed to remain unchanged in real terms throughout the projection period in the reference case). First, even though production of all commodities expands considerably in this scenario, consumption expands even more rapidly and hence self sufficiency declines in all cases except rice. China becomes dependent on meat imports to some extent in the 1990s, expands its import dependence for

<sup>3</sup> The GLS Model is a revised, expanded, and updated version of an earlier model of grain and meat markets developed by Tyers [14]. A detailed description of the new model is provided in [15] and so will not be repeated here.

TABLE VI  
CHINA'S PRODUCTION, CONSUMPTION, AND TRADE IN SELECTED  
AGRICULTURAL PRODUCTS, 1980-83, 1990, AND 1995

	Production (1,000 tons) (p.a.)	Net Imports (1,000 tons) (p.a.)	Availability (1,000 tons) (p.a.)	Apparent Consumption Per Capita (Kg p.a.)	Self- Sufficiency (%)	Share of World (%)		Net Imports <sup>a</sup>
						Production	Consumption	
Rice								
Actual 1980-83	107,450	-530	106,920	107	100	37	37	-5
Projected— reference								
1990	127,000	-1,700	125,300	114	101	36	36	-12
1995	133,000	-1,400	131,600	114	101	34	34	-7
slower income growth								
1990	127,000	-2,510	124,490	114	102	36	35	-16
1995	133,000	-2,370	130,630	113	102	34	33	-12
slower income and agric. growth								
1990	124,000	20	124,020	113	100	35	35	0
1995	129,000	1,470	130,470	113	99	33	34	8
higher domestic prices								
1990	126,000	2,010	128,010	117	98	36	36	13
1995	133,000	2,550	135,550	117	98	34	35	13
Wheat								
Actual 1980-83	66,170	12,400	78,570	79	84	14	17	13
Projected— reference								
1990	85,500	30,000	115,500	105	74	15	20	23

TABLE VI (Continued)

	Production (1,000 tons p.a.)	Net Imports (1,000 tons p.a.)	Availability (1,000 tons p.a.)	Apparent Consumption Per Capita (kg p.a.)	Self- sufficiency (%)	Share of World (%)			
						Production	Consumption	Net Imports <sup>a</sup>	
1955	97,100	39,500	136,600	118	71	15	21	25	
slower income growth									
1990	85,500	25,900	111,400	102	77	15	19	20	
1995	97,000	32,400	129,400	112	75	15	20	21	
slower income and agric. growth									
1990	82,800	28,600	111,400	102	74	14	19	22	
1995	92,100	37,100	129,200	112	71	14	20	24	
higher domestic prices									
1990	86,600	24,700	111,300	102	78	15	19	19	
1995	98,300	33,300	131,600	114	75	15	20	21	
Coarse grain									
Actual 1980-83	85,000	1,080	86,080	86	99	12	12	1	
Projected—									
reference									
1990	104,000	6,400	110,400	101	94	11	12	5	
1995	118,000	12,200	130,200	112	91	11	12	7	
slower income growth									
1990	104,000	6,110	110,110	100	95	11	12	5	
1995	118,000	11,600	129,600	112	91	11	12	7	
slower income and agric. growth									
1990	101,000	7,420	108,420	99	93	11	12	6	
1995	121,000	13,400	125,400	108	89	10	12	8	
higher domestic prices									

TABLE VI (Continued)

	Production (1,000 tons p.a.)	Net Imports (1,000 tons p.a.)	Availability (1,000 tons p.a.)	Apparent Consumption Per Capita (Kg p.a.)	Self- sufficiency (%)	Share of World (%)			
						Production	Consumption	Net Imports <sup>a</sup>	
1990	106,000	3,940	109,940	100	96	11	12	3	
1995	121,000	9,870	130,870	113	92	11	12	6	
Ruminant meat									
Actual 1980-83	800	-60	740	1	108	2	1	-1	
Projected— reference									
1990	1,210	70	1,280	1	95	2	2	2	
1995	1,560	190	1,750	2	89	2	2	3	
slower income growth									
1990	1,210	-20	1,190	1	102	2	2	-1	
1995	1,550	0	1,550	1	100	2	2	0	
slower income and agric. growth									
1990	1,140	40	1,180	1	96	2	2	1	
1995	1,400	140	1,540	1	91	2	2	2	
higher domestic prices									
1990	1,350	-280	1,060	1	127	2	2	-7	
1995	1,730	-270	1,450	1	119	2	2	-5	
Nonruminant meat									
Actual 1980-83	14,600	-60	14,540	15	100	18	18	-2	
Projected— reference									
1990	20,500	2,600	23,100	21	89	19	22	50	

TABLE VI (Continued)

	Production (1,000 tons p.a.)	Net Imports (1,000 tons p.a.)	Availability (1,000 tons p.a.)	Apparent Consumption Per Capita (Kg p.a.)	Self- sufficiency (%)	Share of World (%)			
						Production	Consumption	Net Imports <sup>a</sup>	
1995	24,900	5,400	30,300	26	82	20	24	49	
slower income growth									
1990	20,500	1,370	21,870	20	94	19	21	30	
1995	24,800	2,740	27,540	24	90	19	20	36	
slower income and agric. growth									
1990	19,500	2,230	21,730	20	90	18	21	44	
1995	23,000	4,390	27,390	24	84	18	22	52	
higher domestic prices									
1990	21,400	-1,550	19,850	18	108	20	19	-32	
1995	25,900	20	25,920	22	100	21	21	0	
Dairy products									
Actual 1980-83									
	7,330	320	7,650	8	96	2	2	0	
Projected—									
reference									
1990	11,400	7,820	19,220	18	59	2	3	17	
1995	14,600	15,480	30,080	26	49	2	4	22	
slower income growth									
1990	11,400	5,230	16,630	15	69	2	3	12	
1995	14,500	9,680	24,180	21	60	2	4	15	
slower income and agric. growth									
1990	10,700	5,910	16,610	15	64	2	3	13	
1995	13,100	11,000	24,100	21	54	2	4	16	

TABLE VI (Continued)

	Production (1,000 tons) (p.a.)	Net Imports (1,000 tons) (p.a.)	Availability (1,000 tons) (p.a.)	Apparent Consumption Per Capita (Kg p.a.)	Self- sufficiency (%)	Share of World (%)	
						Production	Consumption
higher domestic prices							
1990	12,900	620	13,520	12	95	2	2
1995	16,500	4,740	21,240	18	78	3	7
Sugar							
Actual 1980-83	4,760	1,090	5,850	6	81	4	5
Projected—							
reference							
1990	8,500	3,980	12,480	11	68	6	13
1995	10,900	6,150	17,050	15	64	7	16
slower income growth							
1990	8,470	2,850	11,320	10	75	6	9
1995	10,900	3,940	14,840	13	73	7	10
slower income and agric. growth							
1990	7,780	3,480	11,260	10	69	5	11
1995	9,600	5,100	14,700	13	65	6	13
higher domestic prices							
1990	9,790	-50	9,740	9	101	7	0
1995	12,600	790	13,390	12	94	8	2

<sup>a</sup> Net imports are expressed as a percentage of the average of "world" exports and imports (where negative numbers refers to net exports as a share of "world" trade), where the projected (but not actual 1980-83) "world" trade volumes exclude trade within country groups in the model (most notably the EC). This means these shares are inflated somewhat, especially for nonruminant meat and dairy products where the majority of world trade is between EC-member countries. The projected trade shares shown for the latter products would be between one-third and one quarter of the shares shown if intra-group trade were to be included in the total.

wheat and coarse grain (in part because of increased feeding of grain to animals) as well as for sugar and dairy products, but increases its slight export surplus of rice because of the assumed low income elasticity of demand for rice. The increased export earnings from rice go only a small way towards paying for the increased food imports, however: by 1995 the net foreign exchange deficit from trade in all these commodities would be almost 4 per cent of GNP, compared with about 2 per cent in the early 1980s.

Second, China's importance in the world market for these products increases in this scenario. Apart from rice and coarse grain, China's shares of world production of these products increases slightly, its shares of world consumption of all except rice and coarse grain increase considerably, and its shares of world imports (exports in the case of rice) expand very substantially. By 1995 China accounts for one quarter of world imports of wheat, for one-sixth of world sugar imports, and for 7 per cent of world rice exports in this scenario (final column of Table VI). Its importance in world imports of nonruminant meat and dairy products also is much greater by 1995 although, as explained in the footnote to Table VI, the shares shown for these two product groups are three or four times greater than they would be if intra-EC trade had not been excluded from the "world" total in the model used.

The considerable degree of food import dependence reflected in the reference projection may be unacceptable to the Chinese government. However, to prevent these declines in self-sufficiency requires that either (1) income or population growth is less rapid, food productivity growth is more rapid and/or income elasticities of food demand are lower than assumed, or (2) domestic producer and consumer prices are raised to boost production and reduce domestic consumption. Each of these two possibilities is considered in turn.

#### B. *Slower Growth Scenarios*

The two "slower growth" projections reported in Table VI assume that real national income grows at one percentage point less than the rate assumed in the reference scenario for the period 1983-95 (5.3 instead of 6.3 per cent per year, or 16 per cent slower). Agricultural productivity growth rates in the first case are the same as assumed in the reference scenario (see Appendix Table I), while they are 16 per cent lower than those rates in the second case.

The effects of assuming slower income growth are quite dramatic. Consumption and import dependence grow much less rapidly, so that the food import bill net of rice export revenue in 1990 in this scenario is about U.S.\$4 billion (in 1980 U.S. dollars) less than in the reference case, a drop of 30 per cent. China's importance in world production and consumption of these commodities is little different, but its share of world imports is considerably lower (except for rice, where its share of world exports increases, and coarse grain, where its share of world imports remain unchanged). Self-sufficiency ratios are still well below 100 per cent for wheat, dairy products, and sugar, however.

Slower growth in national income, however, may be accompanied by slower agricultural productivity growth than has been assumed in the reference case.



The second "slower growth" scenario in Table VI shows that if agricultural productivity growth is *also* 16 per cent slower than in the reference case, self-sufficiency levels will be very close to the reference case because production levels will be lower. That is, slower growth is likely to lead to less food import dependence if the nonagricultural sector alone is slowing down, but not if agricultural growth also slows. Indeed in the latter case China is projected to become a rice importer in the 1990s. Clearly, the slower the rate of agricultural relative to nonagricultural productivity growth, the faster the rate of increase in food import dependence.

### C. *Higher Domestic Prices Scenario*

In the reference and slower-growth scenarios, domestic food prices have been set in real terms at their 1980–82 levels. The fact that even the slower-growth scenarios are projected to involve large volumes of food imports may prompt the government to consider raising domestic food prices further, both to encourage more production and to discourage consumption.

To see how much impact such a strategy might have, a projection has been made assuming the real prices of all GLS products except rice (for which China is projected to maintain an exportable surplus in the reference scenario) are raised by 20 per cent above their 1980–82 level for the period 1983 to 1995. The results of this projection are summarized in the final sets of rows in Table VI. What is important to note from these results is that, even with these large price increases, China is projected to remain dependent on imports of wheat, coarse grain, dairy products, and sugar and to become a net importer of rice (because of substitution in production towards and consumption away from the grains whose prices have risen). The food import bill would only be a quarter of what it is in the reference case, amounting to around U.S.\$3 billion in 1990.

To put the point another way, a 20 per cent increase in China's domestic non-rice food prices is sufficient to ensure self-sufficiency during the next decade only for meat. An increase of around 30 per cent in real domestic prices of milk and sugar would be needed to ensure 100 per cent self-sufficiency in 1995 in those products, even larger price increases would be needed for wheat and coarse grain, and a small increase in the price of rice would be necessary.

### D. *International Effects of Slower Growth or Higher Domestic Prices*

The projected effects of slower growth or higher domestic prices in China on international food markets are summarized in Table VII. All international food prices are necessarily lower in the slower income growth scenario than in the reference scenario because of China's reduced import demands (or increased export supply in the case of rice). This is also true but to a lesser extent for the scenario in which agricultural productivity growth is also lower, again with the exception of rice which in this case is not exported and so its international price is slightly higher. Should China's domestic prices of non-rice foods be raised 20 per cent, international prices for these products would be lower by more than 4 per cent on average, reflecting the very considerable market power

TABLE VII  
PROJECTED EFFECTS OF SLOWER CHINESE ECONOMIC GROWTH OR  
HIGHER DOMESTIC FOOD PRICES ON INTERNATIONAL  
PRICES AND TRADE, 1990 AND 1995

	Rice	Wheat	Coarse Grain	Ruminant Meat	Nonruminant Meat	Dairy Products	Sugar
International prices (per cent difference)							
Slower income growth							
1990	-2.0	-2.4	-1.7	-1.1	-1.6	-2.0	-2.6
1995	-2.6	-3.9	-2.7	-1.9	-2.7	-3.9	-4.1
Slower income and agric. growth							
1990	2.2	-0.5	-0.1	-0.2	-0.4	-1.4	-0.9
1995	3.1	-0.8	-0.5	-0.6	-0.9	-2.8	-1.7
Higher domestic food prices							
1990	3.2	-3.7	-4.1	-3.5	-5.0	-5.6	-8.2
1995	2.7	-4.0	-4.2	-3.8	-5.3	-7.1	-9.0
"World" trade <sup>a</sup> (per cent difference)							
Slower income growth							
1990	4.4	-1.5	-0.6	-0.2	-13.6	-2.9	-2.9
1995	3.5	-2.1	-0.9	-0.9	-17.6	-4.1	-4.4
Slower income and agric. growth							
1990	-6.7	-0.5	0.4	-0.1	-5.7	-2.4	-1.3
1995	1.3	-0.6	0.2	-0.2	-8.3	-3.4	-2.0
Higher domestic food prices							
1990	1.2	-1.3	-2.4	4.3	-7.8	-7.9	-9.7
1995	5.7	-1.2	-2.2	2.2	-31.3	-7.6	-10.4
(1,000 ton difference)							
Slower income growth							
1990	650	-1,930	-760	-10	-720	-1,310	-920
1995	680	-3,260	-1,550	-50	-1,610	-2,870	-1,730
Slower income and agric. growth							
1990	-1,000	-640	-580	-10	-310	-1,080	-410
1995	260	-960	420	-10	-760	-2,380	-830
Higher domestic food prices							
1990	180	-1,660	-3,190	170	-420	-3,650	-3,120
1995	1,080	-1,890	-3,910	130	-2,860	-5,040	-4,100

Note: The differences shown are for the slower-growth and higher-price scenarios as compared with the reference scenario (see text).

<sup>a</sup> See footnote a to Table VI concerning the definition of "world."

which China has in international food markets. The remainder of Table VII shows the effects on quantities traded in international markets. Again, the differences in the volumes traded are largest, and hence the adverse impact on food-exporting countries is largest, in the scenario in which food prices in China are raised—except for wheat and coarse grain, where the adverse effect on other grain producers is almost as large in the slower income growth scenario.

### III. POLICY IMPLICATIONS

Both theory and empirical evidence suggest that agriculture is likely to become a relatively smaller part of the Chinese economy as it grows, contributing by 1995 perhaps only three-fifths of employment, one quarter of GDP, and one-sixth of exports (excluding those processed agricultural products normally considered part of the manufacturing sector). In particular, China's comparative advantage in food production is likely to decline over time unless agricultural relative to nonagricultural productivity growth is even faster than the rapid rate implied by the government's targets. Whether these changes are reflected in a rising deficit in food trade (food import expenditure net of food export revenue) will of course depend on the government's price and trade policies in addition to its policies affecting productivity growth in different sectors.

The more-detailed empirical analysis of world markets for grains, livestock products, and sugar reinforces the above conclusion. Even if real food prices remain unchanged from their 1980-82 levels, the expected rapid rate of agricultural productivity growth will ensure that China's share of world production of most of these products will rise during the next decade, but only slightly. (It is projected to decline slightly in the reference scenario only for rice and coarse grain.) China's share of world food consumption, however, rises substantially in the reference projection. Since only a small share of world food production is traded internationally, and since China is such a large participant in the world food economy, its share of world food imports is projected in this scenario to increase considerably by 1995, with the exception of rice where China's share of world exports grows rapidly. This would occur even if Chinese incomes grew at a slower rate, particularly that the slower rate was due to a slowdown in agricultural productivity growth.

The food exporters of North America, Australasia, and elsewhere would be delighted with such a prospect, since it would bolster international prices for these commodities.

The Chinese government, on the other hand, would view with concern the prospect of a decline in food self-sufficiency. Indeed it is unlikely the government would allow import dependence to increase even to the extent projected in the first slower-growth scenario.

One way to reduce the decline in agricultural comparative advantage is to boost agricultural research and extension efforts beyond those needed to generate the food production growth rates assumed in this paper (and implied by the government's targets to the year 2000). This option may well be insufficient to reverse that declining trend, however, especially if productivity growth continues to be boosted in the nonfarm sectors as well which would ensure that those sectors continue to attract labor and other resources away from agriculture.

The other main option for preventing increased dependence on food imports is to raise domestic producer and/or consumer prices for food. The final projection scenario presented above suggests that the achievement of self-sufficiency in all GLS products would require increases in rice and meat prices of between

10 and 20 per cent, increases of around 25 per cent in coarse grain, milk, and sugar prices, and even larger increases for wheat.

Food price increases would of course be welcomed by Chinese farmers but be viewed negatively by the rapidly growing nonfarm population in China. But what would the net economic welfare effects be for the economy as a whole? The answer depends on the degree to which present prices diverge from their socially optimal levels. If, for example, the exchange rate is currently overvalued, then a devaluation would have the effect of attracting resources away from producing non-tradables and towards producing tradables, including food, while encouraging the opposite switch in consumption patterns and thereby boosting food self-sufficiency.

Suppose, however, that the exchange rate is currently close to its equilibrium level. To what extent are food prices in China different from international food prices measured at the official exchange rate? This question is pertinent because the latter prices represent the opportunity cost to China of producing those products domestically. If China's prices are lower (higher) than prices at the border then, according to standard gains-from-trade theory, the Chinese economy in aggregate is likely to be better off by raising (lowering) domestic prices—even though nonfarm households (farm households) would be made worse off by such changes.

Unfortunately it is not a trivial matter to compare domestic and international prices, not least because of differences in the quality of and marketing services embodied in products to which published price statistics refer. Such comparisons are especially difficult in the case of China, moreover, because so few reliable price statistics are published and, in recent years, multi-tiered pricing policies have operated.

Nonetheless, an attempt has been made to compare available domestic food prices (converted at the official exchange rate) with prices at China's border. The results for the past three decades are summarized in Table VIII and detailed in Appendix B.

These price comparisons suggest there have been substantial differences between China's domestic and border prices. In the 1950s, when agriculture was squeezed in order to boost heavy industry developments, all food prices other than for milk and sugar appear to have been well below international price levels, even when measured at the government's overvalued exchange rate. Grain and meat prices were closer to international market levels in the 1960s, although rice, beef, and mutton producers were still discriminated against relative to what would have been the case under free trade. Producer prices of wheat, milk and sugar continued to be above border prices until the mid-1970s, when international prices more than doubled. Thereafter, because of China's price policy reforms beginning in the late 1970s and the drop in international food prices in the early 1980s, all domestic-to-border food price ratios rose. It appears wheat and corn producers have been protected from import competition at the official exchange rate, while rice prices have encouraged consumption and discouraged production and exports of that staple. Until recently pork production has been encouraged relative to beef and mutton production, although now it would seem that all

TABLE VIII  
RATIOS OF DOMESTIC PRODUCER (CONSUMER) PRICES TO  
BORDER PRICES, CHINA, 1955 TO 1983

	1955-59	1960-64	1965-69	1970-74	1975-79	1980-83
Rice	0.49	0.72	0.75	1.06	0.76	0.92(0.82) <sup>a</sup>
Wheat	0.72	0.96	1.27	1.56	1.17	1.51(1.34) <sup>a</sup>
Corn	0.50	0.73	1.00	1.20	1.06	1.31
Beef	0.68	0.72	0.72	0.58	0.68	0.75
Mutton	0.68	0.72	0.79	0.60	0.61	0.74
Pork	0.64	1.09	1.18	1.10	0.63	0.65
Milk	n.a	1.85	1.99	2.05	2.35	2.36
Sugar <sup>a</sup>	1.02(3.65)	1.29(3.79)	2.43(6.96)	2.06(3.44)	1.17(2.71)	1.25(1.95)

Source: See Appendix B.

Note: Preliminary, subject to revision. These ratios are based on the conversion of domestic prices to U.S. dollars at the same exchange rate as used by the Chinese government in converting its trade statistics.

<sup>a</sup> Allowing for marketing margins, the data suggest that retail grain prices of government-purchased grain in recent years have been subsidized to the extent of about one-sixth the procurement price. Since the sales account for one quarter of total food grain consumption and the procurement price was two-thirds the above-quota producer price used in calculating the producer-to-border price ratio, the consumer-to-border price ratio is estimated to be 11 per cent below the producer ratio for rice and wheat (shown in parentheses). The degree of divergence between consumer and border prices for other commodities except sugar are assumed to be the same as the divergence between producer and border prices; retail sugar price details are shown in Appendix B.

three meats are discouraged by existing price policies, not to mention the discouraging effect of the apparent overvaluation of the yuan in the 1970s and early 1980s (see the black market exchange rates in Appendix Table II). Dairying, by contrast, has apparently enjoyed very substantial government assistance through protection from import competition. Sugar production also appears to have been protected and, perhaps because of high processing costs, consumer prices for refined sugar have been exceptionally high.

It would appear from the final column of Table VIII that even if the exchange rate is not overvalued, an increase of 20 per cent in meat prices and less than 8 per cent in rice prices would still have left these products undervalued relative to international prices in 1980-83 (and more so, the more the exchange rate was overvalued). By contrast, domestic prices of wheat, corn, sugar, and especially milk appear to be overvalued, and by more than the probable degree of overvaluation of the yuan. Thus increasing the domestic prices of these latter products, for the purpose of boosting self-sufficiency in them, would tend to worsen resource allocation and thereby lower national product [10]. A more efficient strategy would appear to be to boost domestic prices for rice and meat alone and use the receipts from exporting the surplus output of these products to purchase imports of other foods and feedstuffs in which China appears to have less comparative advantage.

The latter strategy, of exploiting the economy's comparative advantages, would have a number of implications for the structure of the economy. Within agriculture the rice and meat sectors would expand more while other grain, dairying, and sugar production would grow less rapidly. The intensive production of pigs and poultry using modern grain-feeding methods would be encouraged also by the drop in the domestic price of corn. In addition, the production of non-tradable fruit and vegetable products (demand for which is also growing rapidly as incomes rise) would expand with the release of some cereal cropping land, particularly on land adjacent to towns and cities. More broadly, if this strategy of exploiting comparative advantage was applied throughout the economy, the manufacturing sector would expand its exports of labor-intensive products which would provide the foreign exchange to purchase food and feed imports.

A number of important qualifications need to be stressed, however, in addition to the possibility mentioned above that the exchange rate is overvalued. First, the quantity and price data and the parameters in Appendix Table I on which the analysis is based, and hence the results themselves, have wide confidence intervals attached to them. As better data become available in China, so this type of analysis will need to be revised. Second, the analysis of the distortions implied by the price ratios in Table VIII is partial equilibrium in nature. Its validity is weakened if there are import distortions in other sectors of the economy. For example, if the domestic prices of all other tradables are twice international levels, then national income may increase if food prices (other than for milk) were to be raised somewhat above their 1980-83 level [6]. And third, because of China's size it may have some monopoly power in the international rice and pork markets and some monopsony power in the market for other grains. To the extent that this is so then underpricing the former and overpricing the latter may be an appropriate strategy for maximizing national economic welfare. By how much those domestic prices should diverge from international prices to maximize those monopoly/monopsony rents is an empirical question beyond the scope of this paper, however.

Notwithstanding these qualifications, it is hoped that the above analysis provides some indication of the likely future place of Chinese agriculture in the overall Chinese economy and in the world food economy, as well as suggesting ways in which China might adjust some of its policies so as to better achieve its economic and social objectives.

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## APPENDIX A

## APPENDIX TABLE I

## ESSENTIAL PARAMETERS FOR CHINA USED IN THE FOOD TRADE MODEL

	Producer-(Consumer-) to-Border Price Ratio 1980-82	Price-Independent Production Growth Rate, 1983-95 (% p.a.)	Income Elasticity of Direct Demand	
Rice	0.90 (0.80)	1.5	0.05	
Wheat	1.50 (1.35)	2.6	0.45	
Coarse grain	1.30 (1.25)	2.5	0.10	
Ruminant meat	0.75 (0.75)	5.0	1.00	
Nonruminant meat	0.70 (0.70)	4.0	0.80	
Dairy products	2.30 (2.30)	5.0	1.70	
Sugar	1.15 (1.70)	6.0	1.20	

  

Elasticity of Demand with Respect to the Price of:							
	Rice	Wheat	Coarse Grain	Ruminant Meat	Non- ruminant Meat	Dairy Products	Sugar
Rice	-0.20	0.13	0.05				
Wheat	0.14	-0.30	0.06				
Coarse grain	0.10	0.10	-0.30				
Ruminant meat				-1.50	0.40		
Nonruminant meat				0.04	-1.00		
Dairy products						-2.00	
Sugar							-1.50
(Indirect demand for coarse grain)							
Share of livestock production							
Grain fed in 1982				0.00	0.29	0.00	
1995				0.10	0.40	0.10	
Grain use per unit of output				6.00	5.00	0.40	

  

Long-run Elasticity of Supply with Respect to the Price of:							
	Rice	Wheat	Coarse Grain	Ruminant Meat	Non- ruminant Meat	Dairy Products	Sugar
Rice	0.12	-0.01	-0.01				-0.01
Wheat	-0.02	0.10	-0.02				
Coarse grain	-0.02	-0.02	0.16				
Ruminant meat				0.80	-0.20	0.10	
Nonruminant meat			-0.34		0.60		
Dairy products				-0.08		0.80	
Sugar	-0.12						0.88



APPENDIX TABLE II  
DOMESTIC PRODUCER, DOMESTIC CONSUMER, AND BORDER PRICES, CHINA, 1955-83

Year	Exchange Rate (Yuan/U.S. \$)		Rice (Milled Equivalent)				Wheat			Corn			Beef		
	Official	Black	Producer Price	Border Price	PP BP	Producer Price	Border Price	PP BP	Producer Price	Border Price	PP BP	Retail Price	Border Price	RP BP	
															PP
1955	3.53		52	121	0.43	49	73	0.67	31	76	0.40	425	660	0.64	
1956	3.39		56	117	0.47	52	73	0.72	33	74	0.44	443	640	0.69	
1957	3.36		57	113	0.50	53	73	0.73	33	71	0.47	447	560	0.80	
1958	3.33		60	113	0.53	55	72	0.77	36	55	0.65	450	620	0.72	
1959	3.33		57	112	0.51	53	75	0.70	34	64	0.53	440	790	0.56	
1960	3.37		60	111	0.54	55	73	0.76	36	65	0.55	458	790	0.58	
1961	3.09		82	107	0.77	76	73	1.04	49	64	0.77	506	749	0.67	
1962	3.04		84	114	0.73	77	76	1.02	50	61	0.82	524	696	0.75	
1963	2.94		89	118	0.76	75	75	1.00	52	63	0.83	563	707	0.80	
1964	2.81		93	117	0.80	79	79	0.99	54	73	0.74	587	714	0.82	
1965	2.79		94	120	0.78	79	75	1.05	54	68	0.77	624	739	0.84	
1966	2.75		107	132	0.81	96	75	1.29	65	66	0.98	633	862	0.73	
1967	2.70		113	154	0.73	100	77	1.30	68	68	1.00	645	903	0.71	
1968	2.68		113	170	0.66	100	75	1.34	68	62	1.10	650	929	0.70	
1969	2.66		114	151	0.76	101	66	1.54	68	62	1.10	655	1,027	0.64	
1970	2.46		123	120	1.02	109	69	1.57	74	69	1.07	708	1,106	0.64	
1971	2.49	3.38	157	121	1.30	140	74	1.88	95	72	1.32	698	1,171	0.60	
1972	2.33	2.68	168	120	1.40	150	79	1.89	101	63	1.60	746	1,257	0.59	
1973	2.01	2.08	195	197	0.99	174	105	1.66	118	102	1.16	870	1,710	0.51	
1974	2.01	2.07	196	337	0.58	174	216	0.81	118	114	0.82	876	1,521	0.58	
1975	1.97	2.49	199	365	0.55	177	192	0.92	120	153	0.79	911	1,061	0.86	
1976	1.97	2.38	200	312	0.64	178	169	1.05	120	135	0.89	890	1,299	0.68	
1977	1.97	2.27	200	241	0.83	178	168	1.06	120	120	1.00	911	1,259	0.72	
1978	1.72	2.28	224	296	0.76	206	173	1.19	133	123	1.08	1,040	1,708	0.61	
1979	1.55	2.37	301	289	1.04	319	197	1.61	208	136	1.53	1,352	2,466	0.55	
1980	1.49		342	371	0.92	362	221	1.63	235	162	1.45	1,770	2,436	0.73	
1981	1.78		303	381	0.80	321	216	1.48	209	188	1.11	1,590	2,191	0.73	
1982	1.93		288	301	0.96	305	212	1.44	198	151	1.31	1,571	1,988	0.79	
1983	1.96		283	277	1.02	300	199	1.51	195	144	1.35	1,572	2,057	0.76	

(U.S. dollars per ton)

APPENDIX TABLE II (Continued)

	Mutton			Pork			Milk			Sugarcane			Refined Sugar		
	Retail Price	Border Price	RP/ BP	Retail Price	Border Price	RP/ BP	Producer Price	Border Price	PP/ BP	Producer Price	Border Price	PP/ BP	Retail Price	Border Price	RP/ BP
1955	290	478	0.61	280	580	0.48					6.1	7.7	339	114	2.97
1956	302	444	0.68	294	510	0.58				7.4	7.5	0.98	336	119	2.82
1957	305	430	0.71	351	520	0.68				7.4	9.9	0.75	339	82	4.13
1958	308	443	0.70	355	470	0.76				8.4	6.9	1.21	343	67	5.12
1959	300	418	0.71	367	530	0.69				8.2	6.1	1.34	335	104	3.22
1960	337	433	0.78	397	510	0.78				8.3	6.3	1.32	377	114	3.31
1961	385	487	0.79	555	520	1.07	142	78	1.82	8.6	6.1	1.40	409	110	3.72
1962	391	399	0.98	654	490	1.15	142	78	1.82	9.3	5.8	1.59	421	89	4.73
1963	416	472	0.88	583	440	1.33	144	77	1.88	9.2	9.2	1.00	491	122	4.02
1964	411	460	0.89	596	540	1.10	146	80	1.83	10.4	9.1	1.14	501	158	3.17
1965	416	504	0.83	583	470	1.24	148	86	1.71	10.5	6.3	1.65	495	85	5.82
1966	422	581	0.73	582	480	1.21	150	93	1.62	10.9	5.0	2.16	502	67	7.49
1967	431	559	0.77	593	500	1.19	157	91	1.72	11.1	3.6	3.13	514	66	7.79
1968	433	540	0.80	597	500	1.19	162	70	2.30	11.2	4.3	2.60	517	70	7.39
1969	437	530	0.82	603	570	1.06	167	66	2.55	11.3	4.3	2.62	523	83	6.30
1970	472	563	0.84	650	530	1.23	173	66	2.62	12.2	4.2	2.88	569	101	5.63
1971	465	523	0.89	642	530	1.21	179	78	2.28	12.0	5.0	2.40	562	127	4.43
1972	497	580	0.88	686	560	1.23	202	115	1.75	16.3	6.4	2.55	600	189	3.17
1973	578	900	0.64	787	690	1.14	235	126	1.86	18.9	11.6	1.63	707	254	2.78
1974	601	1,125	0.53	798	1,150	0.69	246	142	1.73	18.5	22.2	0.83	710	606	1.17
1975	605	963	0.63	817	1,100	0.74	268	123	2.18	18.9	38.6	0.47	723	589	1.23
1976	587	886	0.66	823	1,370	0.60	258	112	2.30	18.4	25.0	0.73	739	408	1.81
1977	596	949	0.63	825	1,540	0.54	269	118	2.27	17.8	15.3	1.17	843	289	2.92
1978	683	1,188	0.57	944	1,570	0.60	309	141	2.19	21.1	14.5	1.45	937	246	3.81
1979	863	1,569	0.55	1,146	1,650	0.69	405	144	2.81	29.0	14.3	2.03	991	262	3.78
1980	1,105	1,148	0.96	1,356	1,620	0.84	447	163	2.74	33.7	28.6	1.18	840	534	1.57
1981	958	1,663	0.82	1,186	1,860	0.64	416	184	2.26	30.4	31.7	0.96	763	564	1.35
1982	888	1,716	0.52	1,101	2,000	0.55	397	190	2.09	26.0	19.8	1.30	762	339	2.25
1983	911	1,408	0.65	1,117	1,950	0.57	405	190	2.13	27.3	17.9	1.37	762	291	2.62

## APPENDIX B

ESTIMATES OF DOMESTIC-TO-BORDER PRICE RATIOS  
FOR VARIOUS FOODS, CHINA, 1955 TO 1983

Estimating the extent to which China's domestic producer and consumer prices differ from what they would be in the absence of food price and trade policies is not a trivial matter, even for relatively homogeneous food products. What follows is a very crude attempt to estimate simply the ratio of domestic to border prices. The few available domestic price series are converted to U.S. dollars (for comparison with representative unit import and export values as published by the UN Food and Agriculture Organization), using the same exchange rate as used by China's State Statistical Bureau (SSB) in converting the value of China's foreign trade [see SSB's *China Statistical Yearbook 1984* (p. 395)]. Insofar as this rate overvalues the yuan, the domestic prices shown in U.S. dollars will be overestimated. Thus the resulting domestic-to-border price ratios should be treated as upper-bound estimates. [For estimates of the black market rate of exchange, which has been up to 25 per cent above the official rate in recent years, see Franz Pick's *World Currency Yearbook* (New York: Pick Publishing Co.)].

Procurement prices for grain as an aggregate are given in the SSB's *China Statistical Yearbook 1984* (p. 448). Procurement prices for individual grains for selected years are given in the SSB's *China Agricultural Yearbook 1980* (pp. 380–82). Changes in the former were used to interpolate procurement prices for the missing years in the latter series, assuming all grain prices changed by the same proportions. The marginal price received by growers has exceeded the quota procurement price since 1971. The prices shown are the above-quota procurement prices (involving a 30 per cent bonus during 1971–78 and a 50 per cent bonus thereafter), although it should be recognized that in some recent years the free-market price for residual sales exceeded even these prices. Thus the prices shown in Appendix Table II for grains probably are between the marginal and average returns to producers. China's c.i.f. unit import values are used as border prices for wheat and corn, and f.o.b. unit export values are used for rice, from the FAO's *Trade Yearbooks*. The paddy procurement price is converted to milled rice by dividing by 0.65.

Retail prices of beef, mutton, and pork, from SSB's *China Statistical Yearbook 1984* (p. 448), are assumed to be representative of producer prices plus marketing margins. The beef price is assumed to refer to carcass weight, and so has been multiplied by 1.5 to bring it to a boneless basis for comparison with the c.i.f. unit value for boneless beef imported into the United States. (The Chinese imports are of high-quality beef for the tourist trade and so are not comparable in quality with that consumed by residents; the low-quality beef imported by the United States for the hamburger trade is a more representative border price.) The Australian f.o.b. unit export value for sheep meat, plus a 10 per cent allowance

for transport costs, is used for the border price for mutton. Chinese exports of pork appear to have been of low quality in the 1960s and high quality in the 1970s relative to domestic pork sales and so Hong Kong's c.i.f. unit import value rather than China's f.o.b. unit export value is used as the border price. Again, the trade values are from the FAO's *Trade Yearbooks*. In the absence of Chinese trade values for 1955 to 1959, the unit values used by Anderson, Hayami, and others [*The Political Economy of Agricultural Protection: East Asia in International Perspective* (Sydney: Allen & Unwin, 1986), Appendix 1] for Korea are shown.

Producer prices for milk are from the FAO's *Statistics on Prices Received by Farmers*. The "border price" for milk is the New Zealand producer price plus 60 per cent to cover costs of drying, transportation, and reconstitution [See R. Tyers and K. Anderson, "Distributions in World Food Markets: A Quantitative Assessment" (Canberra: National Centre for Development Studies, Australian National University, 1986), a background paper prepared for the World Bank's *World Development Report 1986*]. For sugar the procurement price for cane is compared with the c.i.f. unit import value for raw sugar divided by 14 to convert it to a cane-equivalent price. The retail price for refined sugar is compared with Hong Kong's c.i.f. unit import value for refined sugar. [Domestic prices are from the SSB's *China Statistical Yearbook 1984* (p. 449); import values from the FAO's *Trade Yearbooks*].

Needless to say, because of the wide confidence intervals surrounding the various domestic price series, the problems of quality differences between the domestic and traded products to which the prices refer, and the differing degrees of marketing (including transport) services included in the prices, these price comparisons must necessarily be used with care and the ratios considered approximate only and subject to revision.